CROWN’S ROAD MAP FOR OILS AND FATS REFINING

THE “MULTIPURPOSE” DEGUMMING/NEUTRALIZING SYSTEM

The key feature in the “Multipurpose” Degumming/Neutralizing system is a reactor with variable retention time and agitation. The design can be used for acid conditioning, various types of degumming, and neutralizing. System can be configured with either silica adsorption in bleaching or washing, which requires a second centrifuge.

PHYSICAL REFINING

The Physical refining process is used for oils and fats with high FFA and contains three basic steps:

1. Neutralizing
2. Bleaching
3. Deodorizing

CONDITIONING

Oils and fats refining involve a series of processes which require acid oil to remove high melting constituents from the oil.

DEGUMMING/NEUTRALIZING

Degumming processes and neutralizing, and for processing

BLEACHING

The key feature in the “DoublePass” Bleaching system is a third filter, which is used to pre-bleach the oil. Degummed or neutralized oil is pumped through a filter containing once used bleaching earth, to reduce the remaining activity of the clay.

Precipitation of Fats

Acidic constituents in the oil, such as calcium, magnesium, and potassium, are removed in the Acid Neutralization/Neutralizing process.

Acid oil or deodorizer distillate are distilled to purify the fatty acids. Acid oil distillate is sometimes converted into soap, which can be used for making soap or as a fat substitute.

The multi-purpose degumming/neutralizing system is able to handle the wide range of oil and fat types that require refining. The design is flexible and can be used for a variety of applications, from small-scale operations to large-scale refineries.

Degumming/Neutralizing

• Silica adsorption and water wash designs for enhanced

Deoiling

When the reaction is finished, the hydrolyzed glycerin is separated from the lower melting liquid fraction. The crystals are then rinsed with calcium and sodium hydroxide solution to remove any remaining impurities.

OIL MODIFICATION PROCESSES

Oils are modified to change their melting characteristics.

Dry Fractionation

Dry Hydrogenation

Hydrogenation

A more recent process that involves the use of a catalyst to lower the melting point of the oil. The catalyst is typically used in conjunction with a hydrogenation reactor, which involves the use of hydrogen gas to lower the melting point of the oil. The process is typically used for oils that have a high melting point, such as palm kernel and coconut oils, and involves the use of a hydrogenation reactor, which involves the use of hydrogen gas to lower the melting point of the oil.
**CHEMICAL REFINING**
The Chemical refining process is used for oils and fats with high FFA and contains three basic steps:
- **Neutralizing**: Neutralization is the first step in chemical refining, where the free fatty acids are converted to soaps. This is typically done with a solution of caustic soda.
- **Acid Conditioning**: In the Acid Conditioning step, the soapstock is heated and reacted with sulfuric acid, which creates acid oil (crude acids).
- **Neutralization of Soapstock**: The soapstock is then neutralized with hydroxide to release free fatty acids.

**DEODORIZING**
Deodorization is a critical step in refining that removes volatiles and traces of odoriferous materials from the oil. This is typically done by passing the oil through a series of heated columns.

**HYDROGENATION**
Hydrogenation is used to alter the melting characteristics of the oil and to improve its oxidative stability. It is typically done in a autoclave or a continuous reactor.

**INTERESTERIFICATION**
Interesterification is a process that rearranges the fatty acid composition of the oil, which can alter its texture and flavor.

**ACIDULATION**
In the Acidulation process, soapstock is treated with sulfuric acid to form soaps, which are then separated and discarded.

**BYPRODUCT PROCESSES**
- **Fatty Acid Distillation**: Fatty acids are distilled to purify the fatty acids and to remove water and other volatile materials.
- **Lecithin Recovery**: Lecithin is recovered from the soapstock and used in various applications.

**ADDITIONAL PROCESSES**
**WINTERIZING PROCESSES**
Winterizing is a term used to describe the process of separating the lower and higher melting fractions of the oil.

**DEWAXING**
Dewaxing removes impurities such as waxes, long chain alcohols, esters, or starches, that create a haze when the oil is stored for an extended period or refrigerated. These waxes are typically removed during the refining process or at the finished product stage.

**ACID OILS**
Acid oils such as sunflower, corn, rapeseed, and soybean contain free fatty acids (FFA) and are used for the production of soaps, detergents, and fuels.

**WATER WASH**
Water wash is used to remove impurities such as calcium, potassium, and sodium from the oil.
**Oils and Fats Refining**

- **Silica adsorption and water wash designs for Enhanced Degumming/Neutralizing Reactor with adjustable retention**
- **Design provides flexibility for switching between the various Degumming/Neutralizing processes accomplished by either water washing or using a silica adsorption in bleaching or water washing, which requires a second centrifuging.**

**CROWN’S ROAD MAP FOR OILS AND FATS REFINING**

**CHEMICAL REFINING**

- The Chemical refining process is used for oils and fats with high FFA and contains three basic steps:
  - **Degumming**
  - **Neutralizing (Washing)**
  - **Bleaching**

**CROWN DESIGN ADVANTAGES**

- **Degumming/Neutralizing**
  - **Design provides flexibility for switching between the various degumming processes and neutralizing, and for processing multiple feedstocks.**
  - **Degumming/Neutralizing Reactor with adjustable retention**
  - **Silica adsorption and water wash designs for Enhanced Degumming and Neutralizing processes.**

**THE ‘MULTIPURPOSE’ DEGUMMING/NEUTRALIZING SYSTEM**

- The key feature in the “MultiPure” Degumming/Neutralizing system is a reactor with variable residence time and agitator. The design can be used for acid conditioning, various types of degumming, and neutralizing. The system can be designed with either silica adsorption in bleaching or water washing, which requires a second centrifuging.

**THE ‘DOUBLEPASS’ BLEACHING SYSTEM**

- The key feature in the “DoublePass” Bleaching process is a third filter, which is used to pre-block the oil. Degummed or neutralized oil is pumped through a filter containing once used bleaching earth, removing the remaining activity of the clay.

**ADDITIONAL PROCESSES**

**WINTERIZING PROCESSES**

- **Winterizing**
  - Some oils such as cornseed, fish and partially hydrogenated soybean are utilized using processes similar to Deodorizing. The Winterizing processes utilized oil at slow rates and do not use filter aid to promote the crystallization.

**HYDROGENATION**

- **Hydrogenation**
  - **Oils such as soybean, canola and partially hydrogenated soybean are utilized using processes similar to Deodorizing.**
  - When hydrogenation is typically a continuous process through some specialty oils or small capacity plants down to batches.

**BYPRODUCT PROCESSES**

**Soapstock Utilization**

- **Soapstock cannot be combined with meal or otherwise disposed of commercially the soapstock may be utilized to recover the fatty acids.**

**Saponification**

- **Saponification**
  - **Caustic is added to make fatty acids Camelion worm acids and calcium and other inorganic salts.**

**Hydrolysis**

- **Hydrolysis**
  - **Hydrolysis is typically a continuous process through some specialty oils or small capacity plants down to batches.**

**Lecithin Recovery**

- **Lecithin Recovery**
  - **Lecithin Recovery**

**Byproduct Processes**

**Byproduct Processes**

- **Byproduct Processes**
  - **Byproduct Processes**

**Acid Conditioning**

- **Acid Conditioning**
  - **Acid Conditioning**

**Neutralizing (Washing)**

- **Neutralizing (Washing)**
  - **Neutralizing (Washing)**

**Bleaching**

- **Bleaching**
  - **Bleaching**

**Fatty Acid Distillation**

- **Fatty Acid Distillation**
  - **Fatty Acid Distillation**

**Acid Oils**

- **Acid Oils**
  - **Acid Oils**

**Acid Water**

- **Acid Water**
  - **Acid Water**

**Acid Oil**

- **Acid Oil**
  - **Acid Oil**

**Acid Water**

- **Acid Water**
  - **Acid Water**